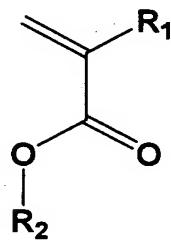


What is claimed is:

1 1. A resin with lowered polydispersity index,
2 comprising the reaction product of the following reactants:
3 at least two different acrylate monomers;
4 at least one initiator; and
5 at least one chain transfer reagent,
6 wherein the reaction product has a polydispersity index
7 of 1.5 or less.

1 2. The resin as claimed in claim 1, wherein the
2 acrylate monomer has a formula (I), of.



3 wherein
4 R₁ is a hydrogen atom, a fluorine atom, a halogen atom,
5 cyano group, saturated or unsaturated alkyl
6 group, amino group, cycloalkyl group,
7 heterocycloalkyl group, polycyclic alkyl group,
8 aryl group, heteroaryl group, arylalkyl group, or
9 alkylaryl group, wherein the saturated or
10 unsaturated alkyl group is straight or branched
11 and has 1 to 12 carbon atoms;
12 R₂ is a hydrogen atom, saturated or unsaturated alkyl
13 group, cycloalkyl group, heterocycloalkyl group,
14 polycyclic alkyl group, adamantyl group, aryl
15 group, heteroaryl group, arylalkyl group, or
16 alkylaryl group,

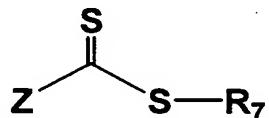
17 alkylaryl group, wherein the saturated or
18 unsaturated alkyl group is straight or branched
19 and has 1 to 12 carbon atoms; and
20 optionally at least one hydrogen atom bonded to the
21 carbon atom of the acrylate monomer according to
22 formula (I) is substituted by a fluorine atom, a
23 halogen atom, cyano group, -R", -CO₂H, -CO₂R", -
24 R"CO₂H, -COR", -R"CN, -CONH₂, -CONHR", -CONR"₂, -
25 OCOR", or -OR", wherein R" is saturated or
26 unsaturated alkyl group having 1 to 12 carbon
27 atoms, thioalkyl group, alkynloxy group,
28 heterocycloalkyl group, alkoxy group, ester
29 group, alkenyl group, alkynylene group,
30 alkenyloxy group, heterocycloalkyl group, aryl
31 group, arylalkyl group, alkylaryl group,
32 heteroaryl group, or combinations thereof,
33 provided that when R" has hydrogen atom bonded to
34 the carbon, optionally at least one hydrogen atom
35 bonded to the carbon atom of R" is substituted by
36 a fluorine atom, or halogen atom.

1 3. The resin as claimed in claim 1, wherein the
2 initiator is an agent generating free radical species
3 through decomposition.

1 4. The resin as claimed in claim 1, wherein the
2 initiator is peroxide initiators, azo initiators, or
3 combinations thereof.

1 5. The resin as claimed in claim 1, wherein the chain
2 transfer reagent is a reversible addition-fragmentation
3 chain transfer reagent.

1 6. The resin as claimed in claim 1, wherein the chain
2 transfer reagent is a reversible addition-fragmentation
3 chain transfer reagent according to formula (III), of



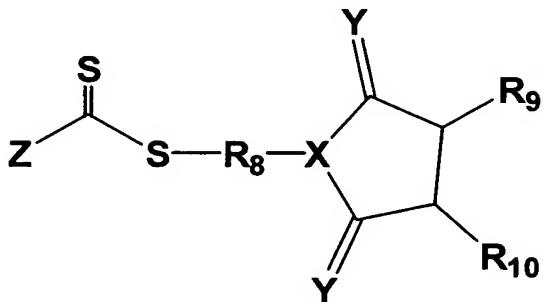
5 wherein

6 Z is a hydrogen atom, a fluorine atom, a halogen atom,
7 cyano group, saturated or unsaturated alkyl
8 group, amino group, cycloalkyl group,
9 heterocycloalkyl group, polycyclic alkyl group,
10 aryl group, heteroaryl group, arylalkyl group,
11 alkylaryl group, heteroalkylaryl group, -CO₂H, -
12 CO₂R", -R"CO₂H, -COR", -CONH₂, -CONHR", -CONR"₂, -
13 OCOR", -OR", -SR" , -NR"₂, or -POR"₂, wherein R" is
14 saturated or unsaturated alkyl group having 1
15 to 12 carbon atoms, thioalkyl group, alkynyoxy
16 group, heterocycloalkyl group, alkoxy group,
17 ester group, alkenyl group, alkynylene group,
18 alkenyloxy group, heterocycloalkyl group, aryl
19 group, arylalkyl group, alkylaryl group,
20 heteroaryl group, or combinations thereof;

21 R₇ is a hydrogen atom, a fluorine atom, a halogen atom,
22 cyano group, saturated or unsaturated alkyl
23 group, amino group, cycloalkyl group,
24 heterocycloalkyl group, polycyclic alkyl group,

25 aryl group, heteroaryl group, arylalkyl group, or
26 alkylaryl group, wherein the saturated or
27 unsaturated alkyl group is straight or branched
28 and has 1 to 12 carbon atoms; and
29 optionally at least one hydrogen atom bonded to the
30 carbon atom of the RAFT reagent according to
31 formula (III) is substituted by a fluorine atom,
32 a halogen atom, cyano group, -R", -CO₂H, -CO₂R", -
33 R"CO₂H, -COR", -R"CN, -CONH₂, -CONHR", -CONR"₂, -
34 OCOR", or -OR", wherein R" is saturated or
35 unsaturated alkyl group having 1 to 12 carbon
36 atoms, thioalkyl group, alkynyoxy group,
37 heterocycloalkyl group, alkoxy group, ester
38 group, alkenyl group, alkynylene group,
39 alkenyloxy group, heterocycloalkyl group, aryl
40 group, arylalkyl group, alkylaryl group,
41 heteroaryl group, or combinations thereof,
42 provided that when R" has hydrogen atom bonded to
43 the carbon, optionally at least one hydrogen atom
44 bonded to the carbon atom of R" is substituted by
45 a fluorine atom, or halogen atom.

1 7. The resin as claimed in claim 1, wherein the chain
2 transfer reagent is a reversible addition-fragmentation
3 chain transfer reagent according to formula (IV), of



4

5 wherein

6 Z is a hydrogen atom, a fluorine atom, a halogen atom,
7 cyano group, saturated or unsaturated alkyl
8 group, amino group, cycloalkyl group,
9 heterocycloalkyl group, polycyclic alkyl group,
10 aryl group, heteroaryl group, arylalkyl group,
11 alkylaryl group, heteroalkylaryl group, -CO₂H, -
12 CO₂R", -R"CO₂H, -COR", -CONH₂, -CONHR", -CONR"₂, -
13 OCOR", -OR", -SR" , -NR"₂, or -POR"₂, wherein R"
14 is saturated or unsaturated alkyl group having 1
15 to 12 carbon atoms, thioalkyl group, alkynyoxy
16 group, heterocycloalkyl group, alkoxy group,
17 ester group, alkenyl group, alkynylene group,
18 alkenyloxy group, heterocycloalkyl group, aryl
19 group, arylalkyl group, alkylaryl group,
20 heteroaryl group, or combinations thereof;

21 R₈ is saturated or unsaturated alkyl group having 1 to
22 12 carbon atoms, thioalkyl group, alkoxy group,
23 alkenyl group, alkynylene group, alkenyloxy
24 group, alkynyoxy group, or combinations thereof;

25 R₉ and R₁₀ are the same or different and are a hydrogen
26 atom, a fluorine atom, a halogen atom, cyano
27 group, saturated or unsaturated alkyl group,

28 amino group, cycloalkyl group, heterocycloalkyl
29 group, polycyclic alkyl group, aryl group,
30 heteroaryl group, arylalkyl group, or alkylaryl
31 group, wherein the saturated or unsaturated alkyl
32 group is straight or branched and has 1 to 12
33 carbon atoms;

34 X is N or -CH;

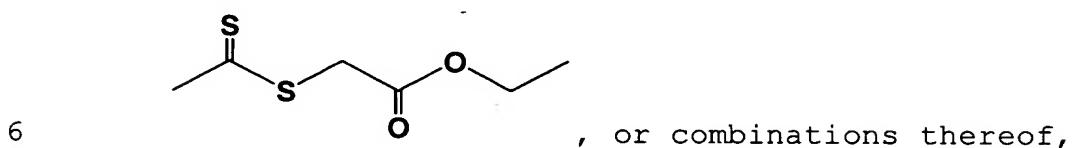
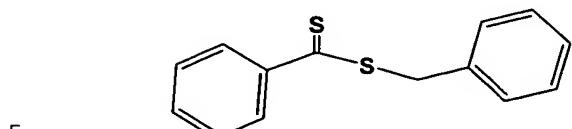
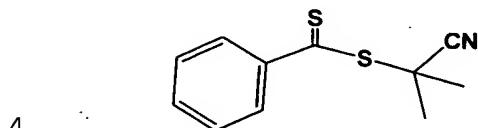
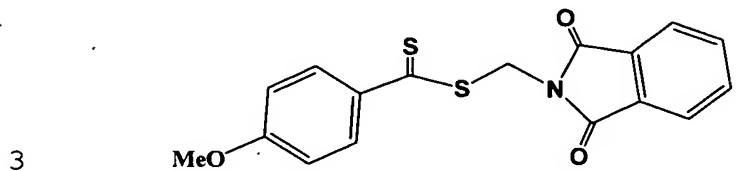
35 Y is O or S; and

36 optionally at least one hydrogen atom bonded to the
37 carbon atom of the RAFT reagent according to
38 formula (IV) is substituted by a fluorine atom, a
39 halogen atom, cyano group, -R", -CO₂H, -CO₂R", -
40 R"CO₂H, -COR", -R"CN, -CONH₂, -CONHR", -CONR"₂, -
41 OCOR", or -OR", wherein R" is saturated or
42 unsaturated alkyl group having 1 to 12 carbon
43 atoms, thioalkyl group, alkynyloxy group,
44 heterocycloalkyl group, alkoxy group, ester
45 group, alkenyl group, alkynylene group,
46 alkenyloxy group, heterocycloalkyl group, aryl
47 group, arylalkyl group, alkylaryl group,
48 heteroaryl group, or combinations thereof,
49 provided that when R" has a hydrogen atom bonded
50 to the carbon, optionally at least one hydrogen
51 atom bonded to the carbon atom of R" is
52 substituted by a fluorine atom, or halogen atom.

1 8. The resin as claimed in claim 7, wherein the R₉
2 and R₁₀ are jointly constructed of cycloalkyl group,
3 heterocycloalkyl group, cycloalkenyl group, arylalkyl group,

4 alkylaryl group, heteroaryl group, or polycyclic alkyl
5 group.

1 9. The resin as claimed in claim 1, wherein the chain
2 transfer reagent is



7 wherein

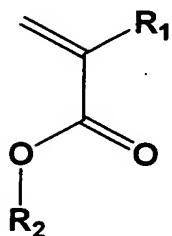
8 optionally at least one hydrogen atom bonded to the
9 carbon atom of the chain transfer reagent is
10 substituted by a fluorine atom, a halogen atom,
11 cyano group, -R", -CO₂H, -CO₂R", -R"CO₂H, -COR", -
12 R"CN, -CONH₂, -CONHR", -CONR"₂, -OCOR", or -OR",
13 wherein R" is saturated or unsaturated alkyl
14 group having 1 to 12 carbon atoms, thioalkyl
15 group, alkynyloxy group, heterocycloalkyl group,
16 alkoxy group, ester group, alkenyl group,
17 alkynylene group, alkenyloxy group,
18 heterocycloalkyl group, aryl group, arylalkyl

19 group, alkylaryl group, heteroaryl group, or
20 combinations thereof, provided that when R" has
21 hydrogen atom bonded to the carbon, optionally at
22 least one hydrogen atom bonded to the carbon atom
23 of R" is substituted by a fluorine atom, or
24 halogen atom.

1 10. The resin as claimed in claim 1, wherein the
2 reaction product has an average molecular weight from 2000
3 to 30000.

1 11. A resin with lowered polydispersity index,
2 comprising the reaction product of the following reactants:
3 at least one norbornene monomer in a ratio from 1ppm to
4 100wt%;
5 at least one acrylate monomer, in a ratio from 0wt% to
6 99.99999wt%, based on the weight of at least one
7 norbornene monomer and at least one acrylate
8 monomer;
9 at least one initiator; and
10 at least one chain transfer reagent,
11 wherein the reaction product has a polydispersity index
12 of 1.5 or less.

1 12. The resin as claimed in claim 11, wherein the
2 acrylate monomer has a formula (I), of:



4 wherein

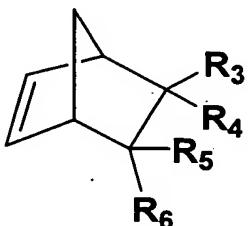
5 R_1 is a hydrogen atom, a fluorine atom, a halogen atom,
6 cyano group, saturated or unsaturated alkyl
7 group, amino group, cycloalkyl group,
8 heterocycloalkyl group, polycyclic alkyl group,
9 aryl group, heteroaryl group, arylalkyl group, or
10 alkylaryl group, wherein the saturated or
11 unsaturated alkyl group is straight or branched
12 and has 1 to 12 carbon atoms;

13 R_2 is a hydrogen atom, saturated or unsaturated alkyl
14 group, cycloalkyl group, heterocycloalkyl group,
15 polycyclic alkyl group, adamantyl group, aryl
16 group, heteroaryl group, arylalkyl group, or
17 alkylaryl group, wherein the saturated or
18 unsaturated alkyl group is straight or branched
19 and has 1 to 12 carbon atoms; and

20 optionally at least one hydrogen atom bonded to the
21 carbon atom of the acrylate monomer according to
22 formula (I) is substituted by a fluorine atom, a
23 halogen atom, cyano group, $-R''$, $-CO_2H$, $-CO_2R''$, $-$
24 $R''CO_2H$, $-COR''$, $-R''CN$, $-CONH_2$, $-CONHR''$, $-CONR''_2$, $-$
25 $OCOR''$, or $-OR''$, wherein R'' is saturated or
26 unsaturated alkyl group having 1 to 12 carbon
27 atoms, thioalkyl group, alkynyloxy group,
28 heterocycloalkyl group, alkoxy group, ester
29 group, alkenyl group, alkynylene group,
30 alkenyloxy group, heterocycloalkyl group, aryl
31 group, arylalkyl group, alkylaryl group,
32 heteroaryl group, or combinations thereof,
33 provided that when R'' has hydrogen atom bonded to

34 the carbon, optionally at least one hydrogen atom
35 bonded to the carbon atom of R" is substituted by
36 a fluorine atom, or halogen atom.

1 13. The resin as claimed in claim 11, wherein the
2 norbornene monomer has a formula (II), of:



3 wherein

4 R₃, R₄, R₅, and R₆ are the same or different and are a
5 hydrogen atom, a fluorine atom, a halogen atom,
6 cyano group, saturated or unsaturated alkyl
7 group, amino group, cycloalkyl group,
8 heterocycloalkyl group, polycyclic alkyl group,
9 aryl group, heteroaryl group, arylalkyl group, or
10 alkylaryl group, wherein the saturated or
11 unsaturated alkyl group is straight or branched
12 and has 1 to 12 carbon atoms; and
13 optionally at least one hydrogen atom bonded to the
14 carbon atom of the norbornene monomer according
15 to formula (II) is substituted by a fluorine
16 atom, a halogen atom, cyano group, -R", -CO₂H, -
17 CO₂R", -R"CO₂H, -COR", -R"CN, -CONH₂, -CONHR", -
18 CONR"₂, -OCOR", or -OR", wherein the R" is
19 saturated or unsaturated alkyl group having 1 to
20 12 carbon atoms, thioalkyl group, alkynyoxy
21 group, heterocycloalkyl group, alkoxy group,
22

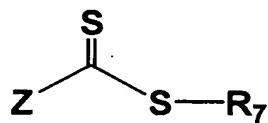
23 ester group, alkenyl group, alkynylene group,
24 alkenyloxy group, heterocycloalkyl group, aryl
25 group, arylalkyl group, alkylaryl group,
26 heteroaryl group, or combinations thereof,
27 provided that when R" has hydrogen atom bonded to
28 the carbon, optionally at least one hydrogen atom
29 bonded to the carbon atom of R" is substituted by
30 a fluorine atom, or halogen atom.

1 14. The resin as claimed in claim 11, wherein the
2 initiator is an agent generating free radical species
3 through decomposition.

1 15. The resin as claimed in claim 11, wherein the
2 initiator is peroxide initiators, azo initiators, or
3 combinations thereof.

1 16. The resin as claimed in claim 11, wherein the
2 chain transfer reagent is a reversible addition-
3 fragmentation chain transfer reagent.

1 17. The resin as claimed in claim 11, wherein the
2 chain transfer reagent is a reversible addition-
3 fragmentation chain transfer reagent according to formula
4 (III), of



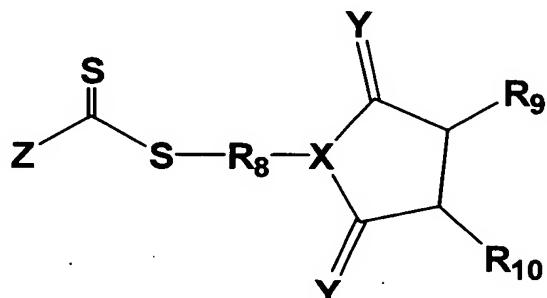
wherein

Z is a hydrogen atom, a fluorine atom, a halogen atom,
cyano group, saturated or unsaturated alkyl

9 group, amino group, cycloalkyl group,
10 heterocycloalkyl group, polycyclic alkyl group,
11 aryl group, heteroaryl group, arylalkyl group,
12 alkylaryl group, heteroalkylaryl group, -CO₂H, -
13 CO₂R", -R"CO₂H, -COR", -CONH₂, -CONHR", -CONR"₂, -
14 OCOR", -OR", -SR", -NR"₂, or -POR"₂, wherein R"
15 is saturated or unsaturated alkyl group having 1
16 to 12 carbon atoms, thioalkyl group, alkynyloxy
17 group, heterocycloalkyl group, alkoxy group,
18 ester group, alkenyl group, alkynylene group,
19 alkenyloxy group, heterocycloalkyl group, aryl
20 group, arylalkyl group, alkylaryl group,
21 heteroaryl group, or combinations thereof;
22 R₇ is a hydrogen atom, a fluorine atom, a halogen atom,
23 cyano group, saturated or unsaturated alkyl
24 group, amino group, cycloalkyl group,
25 heterocycloalkyl group, polycyclic alkyl group,
26 aryl group, heteroaryl group, arylalkyl group, or
27 alkylaryl group, wherein the saturated or
28 unsaturated alkyl group is straight or branched
29 and has 1 to 12 carbon atoms; and
30 optionally at least one hydrogen atom bonded to the
31 carbon atom of the RAFT reagent according to
32 formula (III) is substituted by a fluorine atom,
33 a halogen atom, cyano group, -R", -CO₂H, -CO₂R", -
34 R"CO₂H, -COR", -R"CN, -CONH₂, -CONHR", -CONR"₂, -
35 OCOR", or -OR", wherein R" is saturated or
36 unsaturated alkyl group having 1 to 12 carbon
37 atoms, thioalkyl group, alkynyloxy group,
38 heterocycloalkyl group, alkoxy group, ester

39 group, alkenyl group, alkynylene group,
40 alkenyloxy group, heterocycloalkyl group, aryl
41 group, arylalkyl group, alkylaryl group,
42 heteroaryl group, or combinations thereof,
43 provided that when R" has hydrogen atom bonded to
44 the carbon, optionally at least one hydrogen atom
45 bonded to the carbon atom of R" is substituted by
46 a fluorine atom, or halogen atom.

1 18. The resin as claimed in claim 11, wherein the
2 chain transfer reagent is a reversible addition-
3 fragmentation chain transfer reagent according to formula
4 (IV), of:



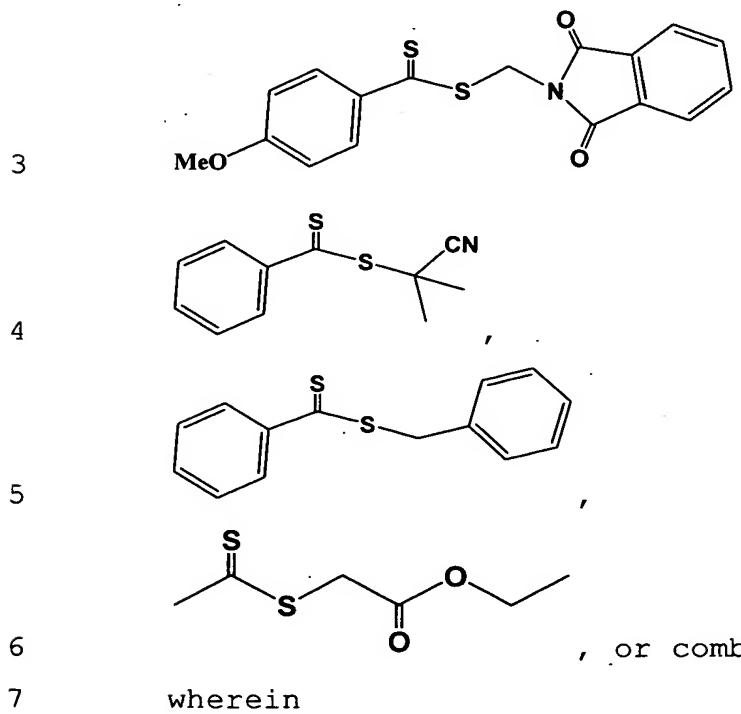
5
6 wherein
7 Z is a hydrogen atom, a fluorine atom, a halogen atom,
8 cyano group, saturated or unsaturated alkyl
9 group, amino group, cycloalkyl group,
10 heterocycloalkyl group, polycyclic alkyl group,
11 aryl group, heteroaryl group, arylalkyl group,
12 alkylaryl group, heteroalkylaryl group, -CO₂H, -
13 CO₂R", -R"CO₂H, -COR", -CONH₂, -CONHR", -CONR"₂, -
14 OCOR", -OR", -SR" , -NR"₂, or -POR"₂, wherein R"
15 is saturated or unsaturated alkyl group having 1
16 to 12 carbon atoms, thioalkyl group, alkynylene

17 group, heterocycloalkyl group, alkoxy group,
18 ester group, alkenyl group, alkynylene group,
19 alkenyloxy group, heterocycloalkyl group, aryl
20 group, arylalkyl group, alkylaryl
21 group, heteroaryl group, or combinations thereof;
22 R₈ is saturated or unsaturated alkyl group having 1 to
23 12 carbon atoms, thioalkyl group, alkoxy group,
24 alkenyl group, alkynylene group, alkenyloxy
25 group, alkynyloxy group, or combinations thereof;
26 R₉ and R₁₀ are the same or different and selected from a
27 hydrogen atom, a fluorine atom, a halogen atom,
28 cyano group, saturated or unsaturated alkyl
29 group, amino group, cycloalkyl group,
30 heterocycloalkyl group, polycyclic alkyl group,
31 aryl group, heteroaryl group, arylalkyl group, or
32 alkylaryl group, wherein the saturated or
33 unsaturated alkyl group is straight or branched
34 and has 1 to 12 carbon atoms;
35 X is N or -CH;
36 Y is O or S; and
37 optionally at least one hydrogen atom bonded to the
38 carbon atom of the RAFT reagent according to
39 formula (IV) is substituted by a fluorine atom, a
40 halogen atom, cyano group, -R", -CO₂H, -CO₂R", -
41 R"CO₂H, -COR", -R"CN, -CONH₂, -CONHR", -CONR"₂, -
42 OCOR", or -OR", wherein R" is saturated or
43 unsaturated alkyl group having 1 to 12 carbon
44 atoms, thioalkyl group, alkynyloxy group,
45 heterocycloalkyl group, alkoxy group, ester
46 group, alkenyl group, alkynylene group,

47 alkenyloxy group, heterocycloalkyl group, aryl
48 group, arylalkyl group, alkylaryl group,
49 heteroaryl group, or combinations thereof,
50 provided that when R" has hydrogen atom bonded to
51 the carbon, optionally at least one hydrogen atom
52 bonded to the carbon atom of R" is substituted by
53 a fluorine atom, or halogen atom.

1 19. The resin as claimed in claim 18, wherein the R₉
2 and R₁₀ are jointly constructed of cycloalkyl group,
3 heterocycloalkyl group, cycloalkenyl group, arylalkyl group,
4 alkylaryl group, heteroaryl group, or polycyclic alkyl
5 group.

1 20. The resin as claimed in claim 11, wherein the
2 chain transfer reagent is



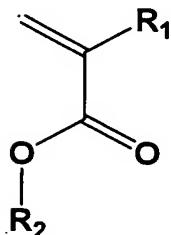
8 optionally at least one hydrogen atom bonded to the
9 carbon atom of the chain transfer reagent is
10 substituted by a fluorine atom, a halogen atom,
11 cyano group, -R", -CO₂H, -CO₂R", -R"CO₂H, -COR", -
12 R"CN, -CONH₂, -CONHR", -CONR"₂, -OCOR", or -OR",
13 wherein R" is saturated or unsaturated alkyl
14 group having 1 to 12 carbon atoms, thioalkyl
15 group, alkynyloxy group, heterocycloalkyl group,
16 alkoxy group, ester group, alkenyl group,
17 alkynylene group, alkenyloxy group,
18 heterocycloalkyl group, aryl group, arylalkyl
19 group, alkylaryl group, heteroaryl group, or
20 combinations thereof, provided that when R" has
21 hydrogen atom bonded to the carbon, optionally at
22 least one hydrogen atom bonded to the carbon atom
23 of R" is substituted by a fluorine atom, or
24 halogen atom.

1 21. The resin as claimed in claim 11, wherein the
2 reaction product has an average molecular weight from 2000
3 to 30000.

1 22. A preparation of a resin with lowered PDI,
2 comprising:

3 reacting at least one reactive monomer, at least one
4 initiator, and at least one chain transfer
5 reagent undergoing polymerization to obtain a
6 resin with lowered PDI,
7 wherein the reactive monomer comprises acrylate
8 monomer, norbornene monomer, or combinations
9 thereof.

1 23. The preparation as claimed in claim 22, wherein
2 the acrylate monomer has a formula (I), of.



3 wherein

4 R₁ is a hydrogen atom, a fluorine atom, a halogen atom,
5 cyano group, saturated or unsaturated alkyl
6 group, amino group, cycloalkyl group,
7 heterocycloalkyl group, polycyclic alkyl group,
8 aryl group, heteroaryl group, arylalkyl group, or
9 alkylaryl group, wherein the saturated or
10 unsaturated alkyl group is straight or branched
11 and has 1 to 12 carbon atoms;

12 R₂ is a hydrogen atom, saturated or unsaturated alkyl
13 group, cycloalkyl group, heterocycloalkyl group,
14 polycyclic alkyl group, adamantyl group, aryl
15 group, heteroaryl group, alkylaryl group, or
16 arylalkyl group, wherein the saturated or
17 unsaturated alkyl group is straight or branched
18 and has 1 to 12 carbon atoms; and

19 optionally at least one hydrogen atom bonded to the
20 carbon atom of the acrylate monomer according to
21 formula (I) is substituted by a fluorine atom, a
22 halogen atom, cyano group, -R", -CO₂H, -CO₂R", -
23 R"CO₂H, -COR", -R"CN, -CONH₂, -CONHR", -CONR"₂, -
24 OCOR", or -OR", wherein R" is saturated or

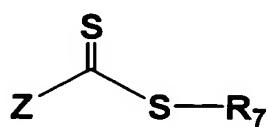
26 unsaturated alkyl group having 1 to 12 carbon
27 atoms, thioalkyl group, alkynyloxy group,
28 heterocycloalkyl group, alkoxy group, ester
29 group, alkenyl group, alkynylene group,
30 alkenyloxy group, heterocycloalkyl group, aryl
31 group, arylalkyl group, alkylaryl group,
32 heteroaryl group, or combinations thereof,
33 provided that when R" has hydrogen atom bonded to
34 the carbon, optionally at least one hydrogen atom
35 bonded to the carbon atom of R" is substituted by
36 a fluorine atom, or halogen atom.

1 24. The preparation as claimed in claim 22, wherein
2 the initiator is an agent generating free radical species
3 through decomposition.

1 25. The preparation as claimed in claim 22, wherein
2 the initiator is peroxide initiator, azo initiators, or
3 combinations thereof.

1 26. The preparation as claimed in claim 22, wherein
2 the chain transfer reagent is a reversible addition-
3 fragmentation chain transfer reagent.

1 27. The preparation as claimed in claim 22, wherein
2 the chain transfer reagent is a reversible addition-
3 fragmentation chain transfer reagent according to formula
4 (III), of



6 wherein

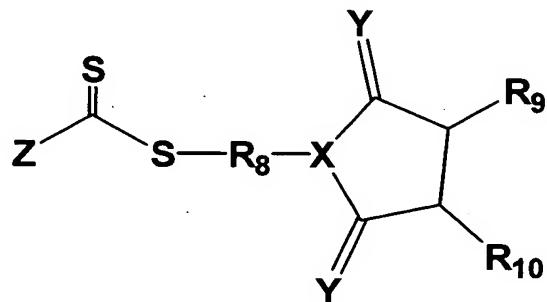
7 Z is a hydrogen atom, a fluorine atom, a halogen atom,
8 cyano group, saturated or unsaturated alkyl
9 group, amino group, cycloalkyl group,
10 heterocycloalkyl group, polycyclic alkyl group,
11 aryl group, heteroaryl group, alkylaryl group,
12 arylalkyl group, heteroalkylaryl group, -CO₂H, -
13 CO₂R", -R"CO₂H, -COR", -CONH₂, -CONHR", -CONR"₂, -
14 OCOR", -OR", -SR" , -NR"₂, or -POR"₂, wherein R"
15 is saturated or unsaturated alkyl group having 1
16 to 12 carbon atoms, thioalkyl group, alkynyoxy
17 group, heterocycloalkyl group, alkoxy group,
18 ester group, alkenyl group, alkynylene group,
19 alkenyoxy group, heterocycloalkyl group, aryl
20 group, group, heteroaryl group, arylalkyl group,
21 or combinations thereof;

22 R₇ is a hydrogen atom, a fluorine atom, a halogen atom,
23 cyano group, saturated or unsaturated alkyl
24 group, amino group, cycloalkyl group,
25 heterocycloalkyl group, polycyclic alkyl group,
26 aryl group, heteroaryl group, alkylaryl group, or
27 arylalkyl group, wherein the saturated or
28 unsaturated alkyl group is straight or branched
29 and has 1 to 12 carbon atoms; and

30 optionally at least one hydrogen atom bonded to the
31 carbon atom of the RAFT reagent according to
32 formula (III) is substituted by a fluorine atom,
33 a halogen atom, cyano group, -R", -CO₂H, -CO₂R", -
34 R"CO₂H, -COR", -R"CN, -CONH₂, -CONHR", -CONR"₂, -
35 OCOR", or -OR", wherein R" is saturated or

36 unsaturated alkyl group having 1 to 12 carbon
37 atoms, thioalkyl group, alkynyloxy group,
38 heterocycloalkyl group, alkoxy group, ester
39 group, alkenyl group, alkynylene group,
40 alkenyloxy group, heterocycloalkyl group, aryl
41 group, alkylaryl group, heteroaryl group,
42 arylalkyl group, or combinations thereof,
43 provided that when R" has hydrogen atom bonded to
44 the carbon, optionally at least one hydrogen atom
45 bonded to the carbon atom of R" is substituted by
46 a fluorine atom, or halogen atom.

1 28. The preparation as claimed in claim 22, wherein the
2 chain transfer reagent is a reversible addition-
3 fragmentation chain transfer reagent according to formula
4 (IV), of:



6 wherein
7 Z is a hydrogen atom, a fluorine atom, a halogen atom,
8 cyano group, saturated or unsaturated alkyl
9 group, amino group, cycloalkyl group,
10 heterocycloalkyl group, polycyclic alkyl group,
11 aryl group, heteroaryl group, alkylaryl group,
12 arylalkyl group, heteroalkylaryl group, -CO₂H, -
13 CO₂R", -R"CO₂H, -COR", -CONH₂, -CONHR", -CONR"₂, -

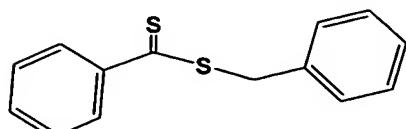
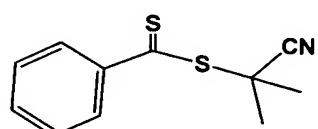
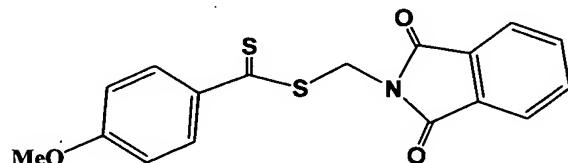
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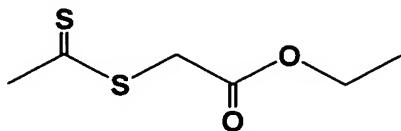
14 OCOR", -OR", -SR" , -NR"2, or -POR"2, wherein R"
15 is saturated or unsaturated alkyl group having 1
16 to 12 carbon atoms, thioalkyl group, alkynloxy
17 group, heterocycloalkyl group, alkoxy group,
18 ester group, alkenyl group, alkynylene group,
19 alkenyloxy group, heterocycloalkyl group, aryl
20 group, alkylaryl group, heteroaryl group,
21 arylalkyl group, or combinations thereof;
22 R8 is saturated or unsaturated alkyl group having 1 to
23 12 carbon atoms, thioalkyl group, alkoxy group,
24 alkenyl group, alkynylene group, alkenyloxy
25 group, alkynloxy group, or combinations thereof;
26 R9 and R10 are the same or different and selected from a
27 hydrogen atom, a fluorine atom, a halogen atom,
28 cyano group, saturated or unsaturated alkyl
29 group, amino group, cycloalkyl group,
30 heterocycloalkyl group, polycyclic alkyl group,
31 aryl group, heteroaryl group, alkylaryl group, or
32 arylalkyl group, wherein the saturated or
33 unsaturated alkyl group is straight or branched
34 and has 1 to 12 carbon atoms;
35 X is N or -CH;
36 Y is O or S; and
37 optionally at least one hydrogen atom bonded to the
38 carbon atom of the RAFT reagent according to
39 formula (IV) is substituted by a fluorine atom, a
40 halogen atom, cyano group, -R", -CO2H, -CO2R", -
41 R"CO2H, -COR", -R"CN, -CONH2, -CONHR", -CONR"2, -
42 OCOR", or -OR", wherein R" is saturated or
43 unsaturated alkyl group having 1 to 12 carbon

44 atoms, thioalkyl group, alkynyloxy group,
45 heterocycloalkyl group, alkoxy group, ester
46 group, alkenyl group, alkynylene group,
47 alkenyloxy group, heterocycloalkyl group, aryl
48 group, alkylaryl group, heteroaryl group,
49 arylalkyl group, or combinations thereof,
50 provided that when R" has hydrogen atom bonded to
51 the carbon, optionally at least one hydrogen atom
52 bonded to the carbon atom of R" is substituted by
53 a fluorine atom, or halogen atom.

1 29. The preparation as claimed in claim 28, wherein
2 the R₉ and R₁₀ are jointly constructed of cycloalkyl group,
3 heterocycloalkyl group, cycloalkenyl group, alkylaryl group,
4 arylalkyl group, heteroaryl group, or polycyclic alkyl
5 group.

1 30. The preparation as claimed in claim 22, wherein
2 the chain transfer reagent is





6 , or combinations thereof,

7 wherein

8 optionally at least one hydrogen atom bonded to the
9 carbon atom of the chain transfer reagent is
10 substituted by a fluorine atom, a halogen atom,
11 cyano group, -R", -CO₂H, -CO₂R", -R"CO₂H, -COR", -
12 R"CN, -CONH₂, -CONHR", -CONR"₂, -OCOR", or -OR",
13 wherein R" is saturated or unsaturated alkyl
14 group having 1 to 12 carbon atoms, thioalkyl
15 group, alkynyloxy group, heterocycloalkyl group,
16 alkoxy group, ester group, alkenyl group,
17 alkynylene group, alkenyloxy group,
18 heterocycloalkyl group, aryl group, alkylaryl
19 group, heteroaryl group, arylalkyl group, or
20 combinations thereof, provided that when R" has
21 hydrogen atom bonded to the carbon, optionally at
22 least one hydrogen atom bonded to the carbon atom
23 of R" is substituted by a fluorine atom, or
24 halogen atom.

1 31. The preparation as claimed in claim 22, wherein
2 the reaction product has an average molecular weight from
3 2000 to 30000.